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SOME OBSERVATIONS ON RORQUALS OFF SOUTHERN NEWFOUNDLAND.

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UNTIL very recently it has been the usage, in books on natural history, to picture Cetacea, when in their native element, as floating lightly on the surface of the water and sending forth from the blow-holes great columns of spray which break and fall in showers over the back. In the works of the older writers, as Bonnaterre and Lacépède, the spouts of whales are represented as solid columns of water, of nearly uniform diameter throughout, which after reaching their maximum height, curve over, either to the front or to the rear, and, breaking slightly, vanish away. Such representations, however, were recognized as entirely inadequate, being merely the conventional vagaries of the artists. K. E. von Baer ('64) seems to have been among the first to attempt an accurate delineation of the whale's spout. He figures a Finback whale in the act of "blowing," the column being a vertical one, expanding very slightly until the maximum height is reached, when it bushes out and gradually becomes dispersed. Henking (:01) also represents in a very diagrammatic way his impression of the form of a Finback whale's

spout. The outline he makes retort-shaped, and the whole is directed slightly backward. Both these authors add that their observations were made in calm weather with a smooth sea.

Not until 1903 have there been published any actual photographs of the larger whales alive and free in the open ocean. The first published photographs of this nature appear in the report on the Cetacea of the Antarctic expedition of the "Belgica." These represent the Humpback whale (*Megaptera nodosa*) and the Sulphur-bottom (*Balænoptera musculus*) in the various positions assumed during their appearance at the surface of the ocean, and were taken by Dr. E. G. Racovitza and Dr. F. A. Cook, in 1898. Only one view is shown of the spout, and this is so indistinct as to be rather unsatisfactory. Later in the year 1903, Dr. F. W. True (:03[a]) published some very excellent photographs of Finback whales (*Balænoptera physalus*) taken from the bow of a whaling steamer off the east coast of Newfoundland. These views show very well the appearance of this whale in its various postures following the spouting, until its final plunge. No photograph of the spout itself was obtained, however, so that it seems worth while to publish a few views of spouting whales obtained by the present writer a few months ago.

Through the courtesy of Mr. Alexander McDougall, manager of the Newfoundland Steam Whaling Company, I had the privilege of visiting the whaling station at Rose-au-Rue, in Placentia Bay, Newfoundland, during the second week of September, 1903. A number of interesting observations were made at this time and a valuable series of photographs was secured, some of which are reproduced here.

Four species of rorquals are taken on the Newfoundland coast: the Humpback (*Megaptera nodosa*), the Sulphur-bottom (*Balænoptera musculus*), the common Finback (*B. physalus*), and the Pollack whale (*B. borealis*) or, as the Norwegians call it, the "Sejhval." True (:03) was the first to record the presence of the last named species on this side of the Atlantic, on the basis of four specimens taken at the Rose-au-Rue station during the season of 1902. The steam whaling industry at Newfoundland is one of recent origin, having been established in 1898. Accord-

ing to the *Morning Chronicle*, of Halifax, N. S., the amount of whale oil produced in Newfoundland for the fiscal year ending June 30, 1902, was valued at $125,287. In addition to the oil which is tried out from the blubber and carcass, an excellent "guano" is prepared from the refuse flesh and the bones are ground up into lime.

The fishery itself is carried on by means of small and staunchly built iron steamers of something over one hundred tons. A cannon-like gun is mounted on a pivot at the bow, and discharges a five-foot harpoon of over 100 pounds weight, which at short range is nearly buried in the body of the whale. A hollow, iron cap filled with blasting powder is screwed to the tip of the harpoon, forming its point. A timed fuse discharges this bomb inside the body of the whale. The harpoon carries a stout cable which is handled by a powerful 5-sheet winch on the steamer's deck.

On September 9th the writer accompanied the whaling steamer "Puma," Captain Christaffersen, on the daily hunt in the lower part of Placentia Bay, and obtained several successful photographs of living whales at close range. A few of these are here reproduced, and illustrate particularly the spout of the Sulphur-bottom whale (*Balænoptera musculus*), no photograph of which has hitherto been published, with the exception of the one by Racovitza.

Both Finback and Sulphur-bottom whales observed on this occasion seemed to go through a regular series of evolutions, and were doubtless feeding. They rose to spout about once in every 12 to 15 seconds with great regularity for perhaps twelve times, after which they dove for a much longer stay of several minutes. The precise length of the longer periods was not accurately determined, but could hardly have been more than 5 or 10 minutes. On rising, the first part of the animal to reach the surface is the top of the head; at the same time it spouts, and a portion of the long back comes into view. The head is then lowered, the body arches slightly and the descent begins. The back comes curving out of the water and down again, till finally the dorsal fin appears. By the time the fin has reached the surface again in its forward and downward move-

ment the entire body has disappeared. The flukes were not thrown out of water by either of the two species seen alive, as has been noted by True and others.

The whale, in diving, leaves a long "slick" on the water at the spot where it went down, and comes up again in regular course several times its length farther on when making a series

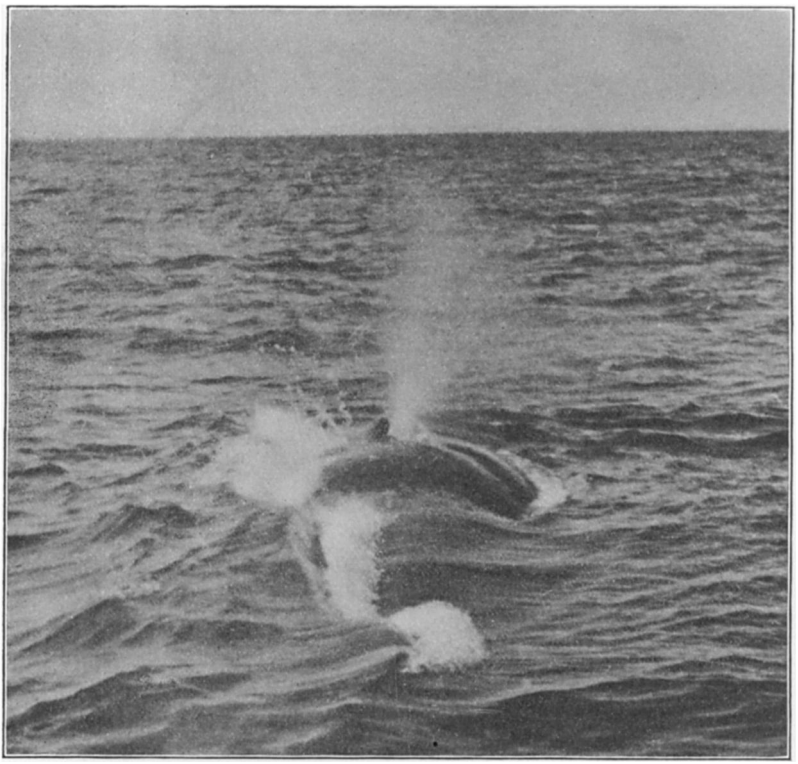

FIG. 1.— A sulphur-bottom whale spouting.

of "spouts" or breathings. The distance between successive spouts seemed to be nearly two or three times the length of the whale, *i. e.*, 150 to 200 feet.

When a whale is sighted the steamer is put about to overtake it, but the endeavor seems to be not so much to head it off as to cut in behind so as not to unduly frighten the animal. On overtaking the quarry, the steamer is manœuvered so as to come

to a stop at about the spot where the whale is expected to rise for the next spout. On one occasion a Sulphur-bottom was thus followed for a considerable distance till finally the vessel came to a standstill at about the place where the next appearance of the animal was expected. The distance had been well judged, and the writer, standing with camera ready, was able shortly to perceive the shadowy form rising obliquely under the port bow. As the whale broke water and shot forth a column of vapor, the click of the camera and the crash of the harpoon gun sounded almost at the same instant. The photograph obtained (Fig. 1) shows the Sulphur-bottom with the region of the blow-holes just

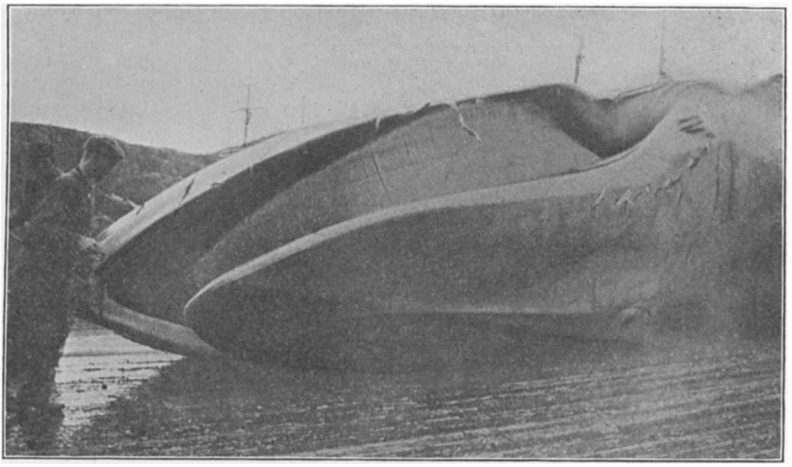

FIG. 2.— Head of a sulphur bottom from above.

out of water. The spout itself was a very short one and is seen to have somewhat the form of a narrow, inverted flask. The wind, blowing from left to right of the picture, carries the upper portion of the vaporous stream away to leeward. The most interesting feature of this view is that the area at each side of the blow-holes is clearly seen to be elevated above the apertures themselves as the breath escapes. The elevation of these ridges is well shown in side view among the photographs obtained by True (:03[a]), and in the drawings by Racovitza (:03), but neither of these observers was able to determine satisfactorily whether it was the blow-holes themselves, or only

the adjacent parts, that were thus raised. In the view here shown, which was taken from directly behind the animal's head, there can be no doubt that the portion elevated in spouting is the region lying along the external side of each nasal aperture. The broad, shallow groove or depression extending downward from each side of the blow-holes may possibly be due to the muscular contraction incident to the raising of the two ridges. The same feature in side view is possibly shown in one of the photographs by True (:03 , Pl. 25, Fig. 2). No such groove was seen in the dead specimens. The column of vapor itself is clearly single, even though arising from two apertures, for the latter are situated so close together that the two jets

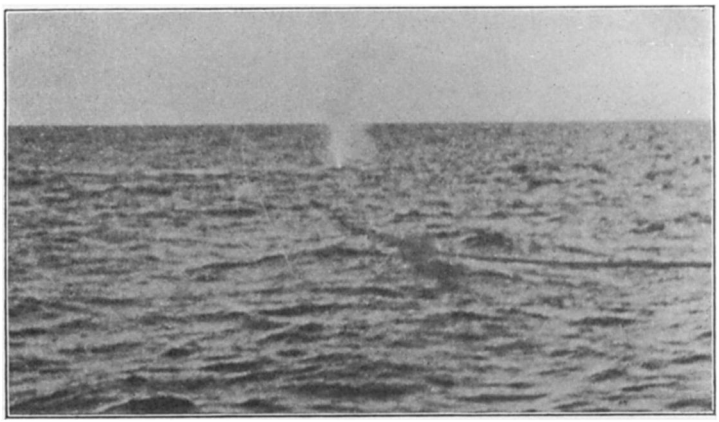

FIG. 3 — Spout of a sulphur-bottom.

of vapor must unite at once. The photographs do not, therefore, bear out Packard's ('66, p. 272) statement, on the testimony of another, that the Sulphur-bottom blows in a "double stream which is directed backward toward the tail." The blow-holes of a large whale of this species are represented in Figure 2. The animal lies on its left side with the upper surface of the head toward the observer. The mouth is partly open, and from it projects the fringe of baleen. The two slit-like nasal openings are seen near the lower right hand of the figure and appear to be situated between the arms of a V-shaped prominence whose point is directed forward, and is continued as a slight

median ridge toward the tip of the snout. In the dead animal, however, there is hardly more than this slight suggestion of the nasal ridges which are so prominent in life.

The form of the spout, in both the Sulphur-bottom and the Finback whale, unless distorted by the wind, is that of a simple column, narrow at the base and gradually increasing in diameter with the height, like a jet of steam forced through a small opening. Such a spout is shown fairly well in Figure 1, Plate 1, of Racovitza's (:03) paper. The views obtained by the present writer all show the effect of the light wind blowing at the time, in that the vapor is carried off to leeward to a greater or less

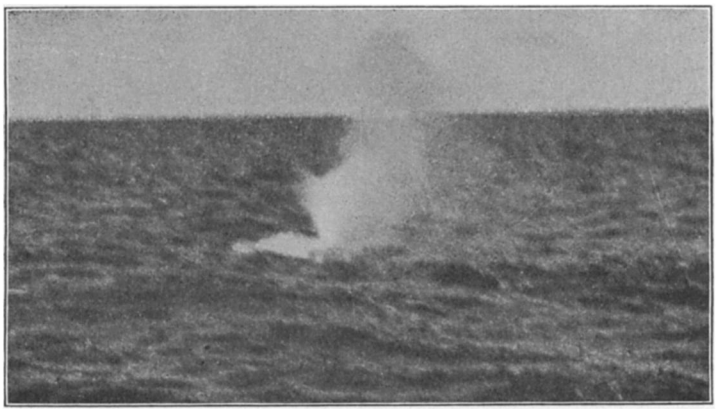

FIG. 4.— An irregular spout of a sulphur-bottom.

extent. Figure 3 shows the spout of a Sulphur-bottom which is fast by a line to the whaling steamer. This view shows the general outline of the column, with a slightly rounded top. Figure 4 shows a spout of an irregular outline from the same whale at closer range. The two harpoon lines by which it is fast to the vessel are seen at the lower right hand. The top of the column is of thin vapor and is being wafted away by the breeze. The lower part of the column is much denser and somewhat in the form of an inverted cone. Possibly the irregular shape may be in part due to a slight wave breaking over the animal's head as it commenced to spout.

The height to which the larger rorquals spout varies consider-

ably according to circumstances. The same individuals are seen at times to make a low spout and again, one twice or perhaps thrice as high. Estimates of the height of the column by seemingly reliable persons run from ten feet up to fifty. It is sometimes stated (*cf.* Beddard, :00, p. 153) that the Sulphur-bottom whale may be recognized by the great height of its spout as compared with that of other large species of rorquals. The writer was unable, however, to distinguish between the spouts of the Finback (*Balænoptera physalus*) and the Sulphur-bottom whale (*Balænoptera musculus*), nor did the men on the whaling

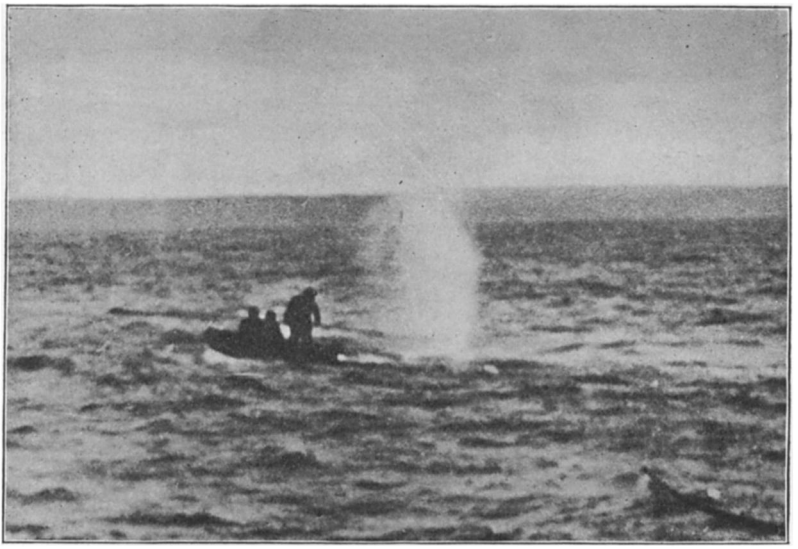

FIG. 5.— Lancing a spouting sulphur-bottom.

vessel believe that the height of the spout afforded any criterion for such a distinction. One of the photographs obtained by the writer, however, affords an opportunity for the direct comparison of the relative heights of a man and of the spout of a whale. Figure 5 shows the captain in the act of lancing a 77-foot Sulphur-bottom which two harpoons had failed to despatch. He stands in the bottom of the boat, alongside the exhausted animal, and the spout, extending up to the skyline in the photograph, is one of average height. The standing height of the man is about

5 feet 8 inches, and the height of the spout is $2\frac{1}{3}$ times as great, or about 14 feet. A maximum spout would probably be close to 20 feet high, which is the estimate I find in my notes taken at the time.

I had no means of accurately estimating the speed at which these whales travel through the water, but it not infrequently happens that the whaler, steaming at ten knots an hour, is unable to overtake a free whale even after a considerable chase. Beddard's statement that the maximum speed of a Sulphur-bottom whale is in the neighborhood of twelve miles an hour is

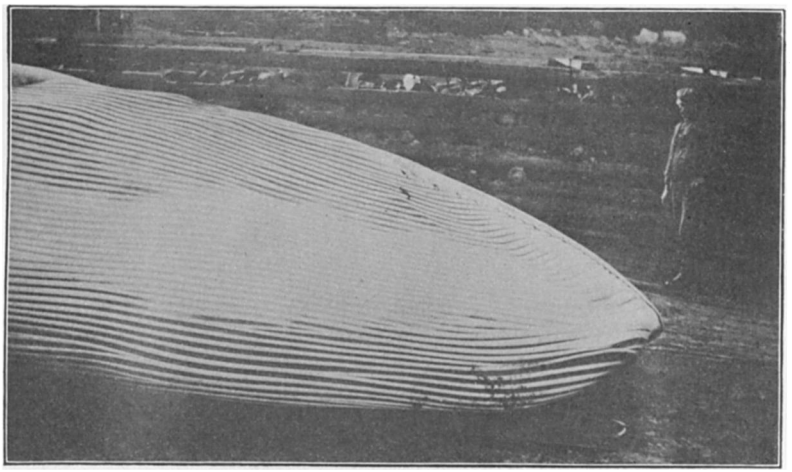

FIG. 6.— Throat of a finback whale.

therefore probably not far from the truth. The ordinary rate of swimming, however, is apparently a little less than this.

During my short stay at the Rose-au-Rue station six whales were taken and all were males. The men told me that at that season (September) the females seek the shallow and more quiet waters of the bays to bring forth their young, and their shyness at this time renders it difficult to approach them. Shortly before my arrival, at about September 4th, a female Finback whale (*Balænoptera physalus*) was killed which contained two calves nearly ready to be brought forth. They were said to have been male and female, about twelve feet long, and were

lying side by side in the uterus with the head of one by the tail of the other. This was the first time that a whale containing more than a single fœtus had been taken by the Company's steamers.

In addition to the photographs of spouting whales it seems worth while to introduce one showing the throat folds. These are usually represented in drawings as simple longitudinal plicæ. Figure 6 represents the ventral side of the throat in a Finback whale (*Balænoptera physalus*). The folds are seen to start from the border of the lips as single plications, but as the expanse of the throat increases posteriorly they fork dichotomously in a fairly definite manner, so that the number of folds at a given part of the center of the throat is greater than that at either end of the corrugated area. Posteriorly the folds run together in reverse order, so that a reduction is effected similar to that found at the anterior region of the throat. Curiously, however, forking may take place in either direction, so that the two new branches may point either anteriorly or posteriorly, but the latter mode of branching was not noticed in the posterior part of the area covered by the folds. Sometimes, also, two folds running parallel to each other may be connected by a short cross-fold, which aids in binding all together.

Up to the time of my visit the whaling steamer *Puma*, operating at Chaleur Bay and at Placentia Bay, had taken in 1903 107 Sulphur-bottoms, 66 Finbacks, 14 Humpbacks, and 1 Pollack whale (*B. borealis*). The last named was captured in Placentia Bay, as were the four taken in 1902.

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